# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/772,499 | 01/29/2001 | Alan Gatherer | TI-30024 | 1361 |

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| 7590      12/02/2004 | EXAMINER |
| RONALD O. NEERINGS | VARTANIAN, HARRY |

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|---|---|
| Texas Instruments Incorporated | ART UNIT     PAPER NUMBER |
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| Dallas, TX 75265 | |

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO 90C (Rev 10/03)

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 09/772,499 | GATHERER ET AL. |
| | Examiner | Art Unit | |
| | Harry Vartanian | 2634 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE **3** MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 August 2004*.

2a)☐ This action is **FINAL**.          2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is

   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 and 3-14* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1.☐ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage

      application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date *9/2004*.

4) ☒ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

**Claims 1 and 3-14 are pending.**

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1.      Claims 1, 3-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Halter et

al(IEEE 10/1998).  Regarding Claim 1, Halter et al meets the limitations of the claim by

disclosing a pipelined(Pg. 267-268, section 4.2) Viterbi decoding method using forward and

backward sliding window operations(Table 1, Pg. 268) wherein state metrics are derived

and stored in memory for each window, i.e. partial block, in parallel(Pg. 269, section 4.3.2).

Regarding Claim 3, the description of the pipelined Viterbi decoding above meets the

limitations of the claim that the sequential processing is done in two directions.  Regarding

the use of prologs, the applicant defines that a prolog "consists of the several bits to the left

of the sliding window. This is shown by the **overlap between successive sliding blocks**

in the figure"(Pg. 14, para 2).  Halter et al state that a state metric can be calculated at "an

intermediate starting point "k" along some window length "L"(Pg. 267, section 4.2).

Therefor he says that the recursion does not start from the "last time step of the trellis" (Pg.

267, section 4.2) indicating that there is overlap among the windows.

Regarding Claim 4, Halter et al meets the limitations of the claim by disclosing that

the state metrics are derived and stored in memory for each window, i.e. partial block, in

parallel(Pg. 269, section 4.3.2).

Regarding Claim 5, Halter et al meets the limitations of the claim by disclosing that

the processing of the blocks of windowed data is also pipelined(Pg. 268, paragraph 2).

Regarding Claim 6, the rejection for claim 1 above meets the limitations of the claim.

The additional limitation of performing steps a) and b) in parallel is meet with the specific

disclosure of state metric calculation

Regarding Claim 7, Halter et al meets the limitations of the claim by disclosing that

the processing of the blocks of sliding window data is also pipelined(Pg. 268, paragraph 2).

### Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or
> described as set forth in section 102 of this title, if the differences between the subject
> matter sought to be patented and the prior art are such that the subject matter as a
> whole would have been obvious at the time the invention was made to a person having
> ordinary skill in the art to which said subject matter pertains.  Patentability shall not be
> negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459

(1966), that are applied for establishing a background for determining obviousness under

35 U.S.C. 103(a) are summarized as follows:

1.    Determining the scope and contents of the prior art.
2.    Ascertaining the differences between the prior art and the claims at issue.
3.    Resolving the level of ordinary skill in the pertinent art.
4.    Considering objective evidence present in the application indicating
      obviousness or nonobviousness.

2.    Claims 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Halter

et al(IEEE 10/1998) in view of Abbaszadeh (US Patent 6,563,877).  Regarding Claim 8,

Halter et al meets all the limitations of Claim 8(see above paragraphs) including the use of an adder(Pg. 270, section 4.3.2.1) tree(Pg. 271, figure 7) in the state metric calculation of pipelined parallel Viterbi decoding. Halter et al fails to teach the use of a maximum finding operation.

However, Abbaszadeh discloses the use of "maximum finding" among trellis states that includes the use of a normalization block(Column 6, Line 63 to Column 7, Line 26). Therefor it would have been prima facie obvious to use a maximum finding operations in a MAP decoding method. A motivation to combine is that it is well known in the art that finding a maximum state metric is a common step in Viterbi and Trellis decoding. For instance, maximum finding is used in Maximum Likelihood Viterbi decoding as stated by Abbaszadeh(Column 2, lines 47-53).

Regarding Claims 9 and 12, Abbaszadeh meets the following limitations:

> wherein the maximum-finding operation is an exponent-logarithm equation.**(Column 5, lines 31 -35)**

Regarding Claims 10 and 13, Abbaszadeh meets the following limitations:

> wherein the maximum-finding operation is an estimation of an exponent-logarithm function.**(Column 5, lines 31 -35)**

Regarding Claim 11, Abbaszadeh discloses the use of a "normalization operation on the results" in figures 8 and 9. Please also see Column 6, Line 63 to Column 7, Line 26 for the specifics.

3.        Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Halter et al(IEEE 10/1998) in view of Van Stralen et al (US Pat #6,304,996). Halter et al meets all the limitations of Claim 14(see above paragraphs), except disclosing an alpha and beta generation process in their Map decoding systems.

However, Van Stralen et al meets the following limitations of the Claim:

    an alpha generation process; **(Column 1, Line 45 to (Column 2 , Lines 5)**

    a beta generation process; **(Column 1, Line 45 to Column 2, Lines 5)**

Therefor, it would have been prima facie obvious to a person having ordinary skill in the art to which said subject matter pertains to use an alpha and beta generator in a pipelining, parallel, sliding window MAP decoder. The motivation to combine is stated by Van Stralen et al. They state the alpha and beta processes are essentially equivalent to the forward and backward recursions stated by Halter et al. More specifically, he states:

> "Three fundamental terms in the MAP algorithm are the forward and backward state probability functions (the alpha and beta functions, respectively) and the a posteriori transition probability estimates (the sigma function)." **(Column 1, Lines 22-36)**

The motivation to do the alpha and beta operations in parallel are also stated by Van Stralen et al:

> "Two gamma probability function values are provided via selection switches to the alpha and beta blocks for calculating the alpha and beta probability function values, i.e., performing the alpha and beta recursions, respectively, in parallel, thus significantly increasing decoding speed." **(Column 1, Line 45 to Column 2, Lines 5)**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Vartanian whose telephone number is 571.272.3048. The examiner can normally be reached on 10:00-6:30 Mondays to Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571.272.3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry  Vartanian
Examiner
Art Unit 2634

HV

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